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# MCZ newsletter

MUSEUM OF COMPARATIVE ZOOLOGY

## Kenneth Sebens Receives Ecology Award

Dr. Kenneth P. Sebens, Associate Professor of Biology and Associate Curator of Coelenterates, is the recipient of the George Mercer Award from the Ecological Society of America "In Recognition of Outstanding Ecological Research Published in the United States or Canada" for 1983 for the best paper by an investigator under 40. The work for which Sebens was honored was entitled "The Limits to Indeterminate Growth; An Optimal Size Model Applied to Passive Suspension Feeders" which appeared in Volume 63 of the journal *Ecology*.

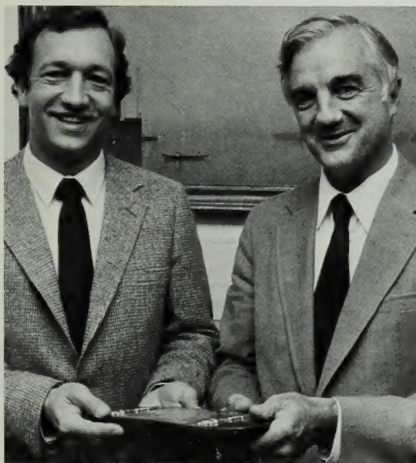


Photo by Jane Reed

Harvard President Derek Bok presents Dr. Kenneth Sebens the George Mercer Award on behalf of the Ecological Society of America on October 5.

The paper presents a model of the relation of body size to habitat quality and a study of these processes in a species of sea anemone found on the West Coast. He is currently conducting similar studies on octocorals off the Massachusetts coast.



Photo by Douglas Denninger

Sebens and undergraduate assistants John Sigda and Mark Ashenfelter at work. Halfway Rock off Beverly, Massachusetts is in the background.

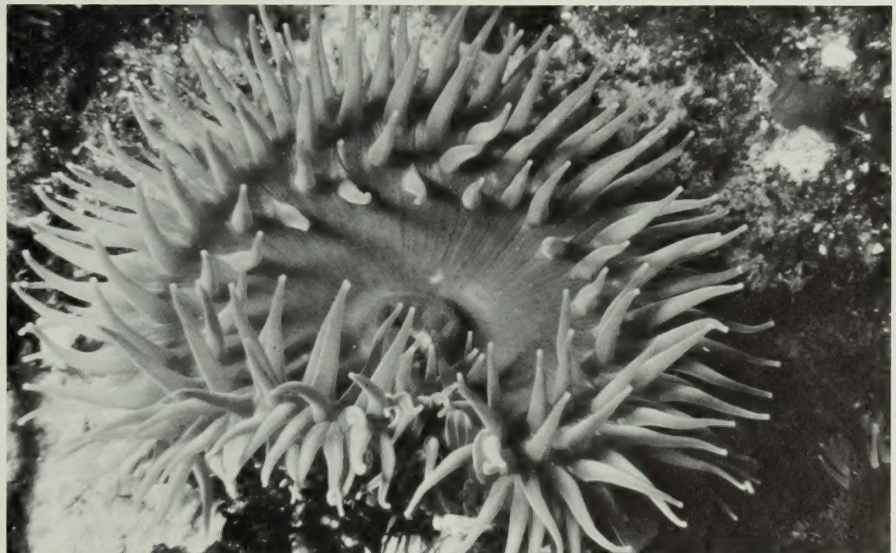


Photo by Kenneth Sebens

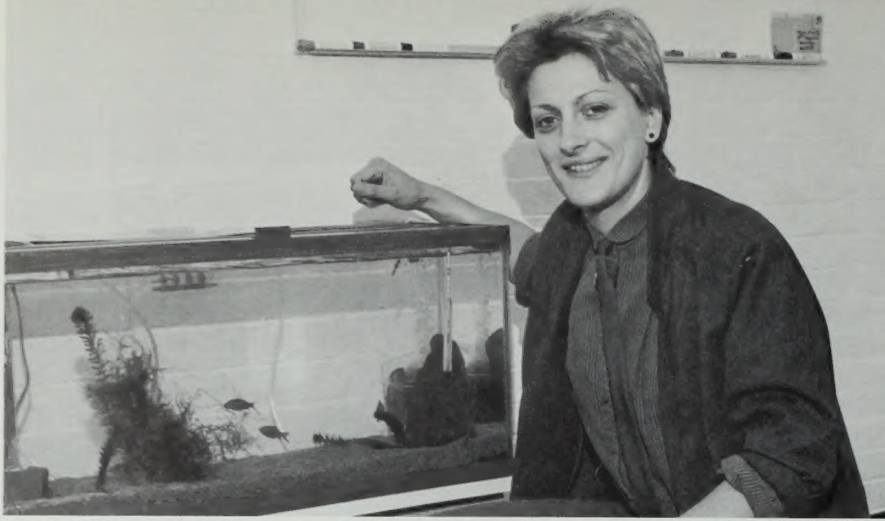
The giant green anemone, *Anthopleura xanthogrammica*, the subject of Sebens' award-winning study.

Many species of marine invertebrates exhibit indeterminate growth; they vary greatly in size and can grow or shrink as conditions change. It has been hypothesized that such factors as food availability and physiological

stress (for example, temperature differences in the intertidal zone which can lead to high metabolic rates) in their habitat are responsible for the variation. In higher animals, size is often genetically

*Continued on page 7*





*Dr. Melanie L. J. Stiassny keeps an active population of cichlid fishes in her MCZ office. She cautions visitors not to startle them and has an accurate gauge of her pets' level of distress—they turn yellow when scared.*

## Melanie Stiassny Appointed to Fish Department

The new Assistant Professor of Biology and Assistant Curator of Ichthyology, Dr. Melanie L. J. Stiassny, comes to the MCZ from postdoctoral studies at the University of Leiden and the Rijksmuseum voor Natuurlijk Historie in Holland. Born in Germany, Stiassny grew up in England and received her Ph.D. from London University and the British Museum, where she studied with Dr. Humphrey Greenwood.

Her research focusses on the inter- and intrafamilial relationships of cichlid fishes and she welcomes the complementary relationship she enjoys with the other cichlid researchers at the MCZ including Professor Karel Liem, who analyzes cichlid variation by concentrating on their functional morphology, and graduate student Rob Dorit, who is studying cichlid speciation at the molecular level.

One of the pivotal questions raised by the explosive speciation of cichlids is: are these multitudes of species (conservative estimates range as high as 250 distinct endemic species in Lake Victoria alone) monophyletic, i.e., descended from a single ancestral species? Stiassny has been able to show through rigorous anatomical analysis that they are. Another question she has attempted to answer is

whether the remarkably similar-looking cichlids from two different lakes are related or products of convergent evolution, i.e. similar conditions produced similar fish. By comparing the fishes from Lakes Malawi and Tanganika she has shown that they are, in fact, convergent and not related.

Stiassny plans a collecting trip in the rivers and lakes of West Africa and the Zaire basin as well as field work in the Amazon and Panama. She is serving as thesis advisor to graduate student, Robert O'Hara, who is studying penguin systematics. The connection is quite legitimate since penguins eat fish.

## Rob Dorit Returns from Field Season in East Africa

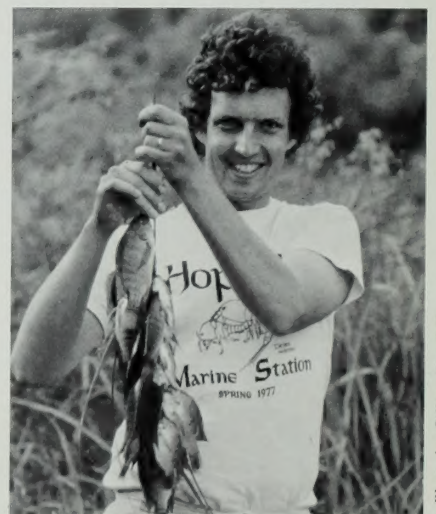
Fourth-year graduate student Rob Dorit combined leading a Friends of the MCZ safari to Tanzania with a season of field work in Kenya and Tanzania this summer. Both ventures were a great success: the Friends witnessed the spectacular wildlife of Africa and also learned a great deal about the biology of the animals from Dorit; and the fishes in Lake Victoria were plentiful and easy to catch, with the expert assistance Dorit received from local Luo fishermen. Dorit was able to bring back enough specimens to feed his research project on the genetic and morphological correlates of explo-

sive speciation until he returns to Lake Victoria next year.

Like Stiassny, Dorit is addressing the tantalizing question posed by the sheer number of cichlid species (no-one knows why there are so many) and is attempting to establish their genealogy by getting a detailed picture of the mitochondrial DNA sequence and comparing variations in that sequence between and within species. Since the fish are extremely similar in external appearance, the molecular profile will provide an independent source of evidence for understanding this group.

Dorit is also looking at the variation in certain external characteristics within species from different localities to see whether any differentiation occurs within a given lake. Dorit has observed that, in certain cichlid species, some differentiation may occur without complete geographic isolation. This observation, coupled with the fact that extensive cichlid radiations have occurred in a number of Rift lakes, has led Dorit to focus his attention on the biology and population structure of fish, rather than on unique geological conditions in each lake.

With his wife and field assistant, Gillian Kendall, Dorit will return to East Africa next summer. This time he will lead a Friends of the MCZ safari to Kenya and again spend the rest of the season collecting cichlids.



*Just an average morning's cichlid catch for Rob Dorit.*

Photo by Gillian Kendall



## Kenneth Miyata 1951–1983

Kenneth Miyata, Associate and former student in the Museum of Comparative Zoology's Herpetology Department, died in mid-October while on a fishing expedition in Montana. An expert on tropical reptiles and amphibians who received his Ph.D. in 1980, his photographs of the frogs of Ecuador have been widely exhibited and published and are a highlight of the MCZ's Annual Open House. He also served as naturalist guide on Friends of the MCZ trips to Ecuador, the Galapagos Islands, and Peru. An obituary prepared by his professor, Ernest E. Williams, will appear in the next issue of the *MCZ Newsletter*.



*This photograph was picked by Ken Miyata for the frontispiece of his Ph.D. thesis. The caption reads: "The author struggles with Chapter 1 on board the M/N Isabela just off the coast of Charles Island (Floreana), Galapagos Archipelago. April 1980."*

## MCZ Honors Ernest E. Williams with Publication of Essay Collection

*Advances in Herpetology and Evolutionary Biology; Essays in Honor of Ernest E. Williams* has just been published by the MCZ. Co-edited by Anders G. J. Rhodin and Kenneth Miyata, the volume includes 50 contributed papers by 69 authors, who comprise a broad circle of former students and research associates.

What is particularly striking about this comprehensive collection is the rich diversity of scientific perspectives represented. As the editors note in their preface:

"Though the majority of his own work has been in herpetology, focusing primarily on museum and field investigations, Ernest's interests encompass much of modern evolutionary biology. This volume is a testament to the extraordinary breadth of his interests in the evolutionary biology of both vertebrates and invertebrates. More than that, it is a testament to the enormous influence he has had on students and colleagues in fostering this wide range of interests. Ernest's ability to encourage and stimulate research is remarkable . . . His openness to new ideas, his willingness to tolerate unusual approaches and behavior, and his ability to stimulate and guide without making it obvious are

all unusual, if not unique, in a man of his stature."

When asked what he thought of his *festschrift*, Williams responded: "I like it! I like it because it is a multi-author book in which I read every paper with interest and pleasure and that is unusual. I don't like the picture of me in the front—it spoils my image of myself. But I like the articles, and the quality of the editing and printing."

Professor Williams is now retired as Curator of Herpetology



*Drawing by Laszlo Meszoly*

*An as-yet unnamed species of the lizard, genus Anoles, which was being described by Robert Bleiweiss, who has just received his Ph.D., and Kenneth Miyata at the time of Ken's recent death.*

but he continues as Professor of Biology with an active research program. He has recently completed an appointment as a Regents Fellow by the Smithsonian Institution.

Copies of the book may be purchased from the MCZ Publications Office.

## Staff Notes

Professor *emeritus* Ernst Mayr has received a grant from the Alfred P. Sloane Foundation to provide his support for the next three years while he writes a book on the philosophy of biology. He will begin the new work in earnest on January 1 after completing three or four manuscripts currently in progress.

Laurie Godfrey, the recipient of a two-year Science Scholar fellowship from Radcliffe's Bunting Institute, is using the MCZ's mammals collections as part of her study of the patterns of skeletal allometry in Malagasy primates. An Associate Professor of Anthropology at the University of Massachusetts/Amherst, Godfrey plans to visit Madagascar to study the collections of extinct and extant lemurs at the University of Madagascar in Tananarive this winter.



## Public Programs

### New Advisory Board

An Advisory Board to Public Programs has been established, chaired by **Emily Hubbs Scott** and including **Dorothy A. Brown**, **John D. Constable**, **F. Ross Holmstrom**, **Lynda L. Holmstrom**, **Herbert W. Pratt**, **Patricia R. Pratt**, **Sarah F. Robbins**, **Alfred W. Scott**, **Emily V. Wade**, and **Jeptha H. Wade III**, to increase the MCZ's responsiveness to public interests. The Board will help in planning and implementing our activities for the Friends and Public Programs in general. Lynda Holmstrom has been active over the past year as head of the parents' Advisory Committee which is raising funds to support the MCZ's Cambridge School Program.



*Emily Hubbs Scott*

A concert to benefit the MCZ, followed by a champagne supper, on December 9 has been organized by Emily Hubbs Scott and an active committee. **Martha Babcock**, cellist, **Yvette Roman Schleifer**, pianist, and **Harvey Siegel**, violinist will be performing at the home of **Arthur and Yvette Schleifer** in Newton Centre. Attendance is limited to the first 100 Friends of the MCZ who subscribe.

A year-end appeal letter has been sent to all the Friends of the MCZ, providing another opportunity to contribute to the continuing improvement and expansion of the MCZ's public outreach programs.

## Travel Program

The Friends' trip to India and Nepal in March, 1984 is entirely filled and has a waiting list. Other plans for 1984 include a new trip to "Discover the Nature of Israel" (April 4-15) which will give participants an opportunity to view the Holy Land from a different perspective. This is our first collaborative trip effort, joining forces



*A young striped hyena in Israel.*



*Migrating Egyptian vulture over Elath.*

with good friends at the International Oceanographic Foundation in Miami. Brochures have been sent to all current Friends and additional copies are available.

The Friends of the MCZ will also return to East Africa for another exciting safari (August 9-26), this time to **Kenya** when the wildebeest will be migrating through the

Mara. Not a camping trip this time, the group will stay in some of Kenya's most famous lodges. Led again by **Rob Dorit**, it promises to be the ideal trip to not only see the abundant wildlife but to learn about the animals' biology in a well-paced, comfortable way.

This year's **Bay of Fundy/Campobello Island** trip in late August was a great success again despite



*Puffins on Machias Seal Island, on the itinerary of next year's Bay of Fundy visit.*

the fact that the right whales were not in the area at the time (they did return in good numbers later in September). The group was more than satisfied with the appearance of approximately 80 pilot whales who surrounded the boat for more than an hour. Two fin whales and a pair of white-sided dolphins were also seen at close range on that outing.

A return to the area in 1984 for "Puffins, Birds, and Tide Pools: A Seminar on the Maritime Ecosystem of the Bay of Fundy" is planned for July 13-17. The seminar will be jointly taught by **Randy**



*A gannet made its nest on a dory in the Head Harbor Passage, Lower Bay of Fundy, giving this year's participants a perfect close view.*



**Olsen**, a Harvard graduate student currently completing his thesis work on marine invertebrates, and **Norman Famous**, a bird and botany expert from the University of Maine/Orono who has been the MCZ's guide in the Bay of Fundy for the last two seasons. The group will stay at "cottages" at the Roosevelt Campobello International Park, and will utilize the excellent facilities for seminar sessions. A full-day boat trip to Machias Seal Island at the height of the puffin-nesting season is planned as well as tide-pool and peat-bog walks, and early-morning birding.

The Trip Committee has been busily making plans for 1985. Currently being developed are trips to **Borneo** and **Spain/Morocco**. **Sri Lanka** is high on the list for 1986.

For more information about any of these expeditions, please call Gabrielle Dundon at 495-2463.

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*Editor: Gabrielle Dundon  
Photographer: A. H. Coleman*



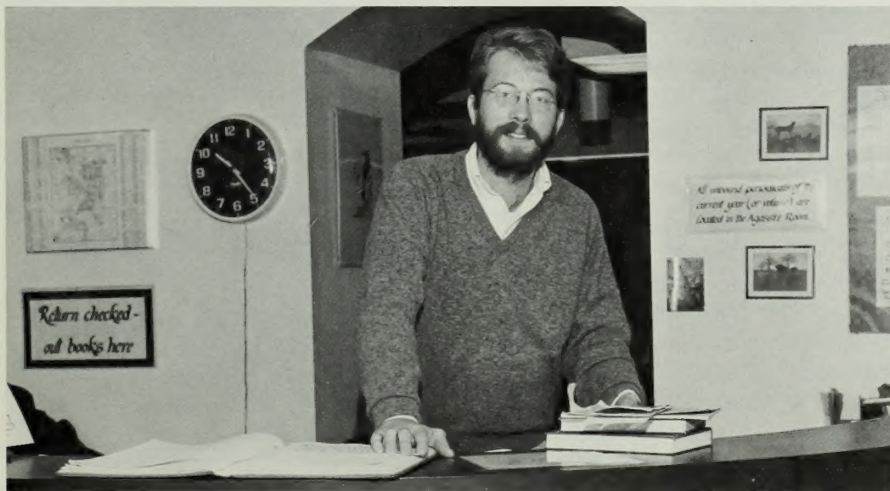
*Chantal Kammrath, Shop Manager, in action.*

## Museum Shop Prepares for Christmas

**Chantal Kammrath**, Manager, is stocking the shelves of the Agassiz Museum Shop with the unusual gifts that have made this shop a required stop for many local Christmas shoppers. This year she has also prepared a mail order form for more distant Friends who would like to purchase natural history gifts. Among the most popu-

lar perennial items are fossils, minerals, the Instant Zoo, amber jewelry, and nature books. New items this year include gem-stone necklaces, wooden insect models, and a pyritized shark jaw. Special Christmas shopping hours are planned. Call 494-4473 for information.

## Library Appoints New Public Services Supervisor



**Mark Matthewman** joined the MCZ Library staff in August to assume responsibility for services to the public. In this capacity he

provides reference assistance, supervises the front desk staff, and plays the pivotal role in implementing the newly-tightened secu-

rity measures to ensure the safety of the MCZ's invaluable collection.

Matthewman's previous library experience was at the Biomedical Library at Dartmouth College where he was Circulation Supervisor. He earned an MA degree in 1979 from the University of Sheffield, England in Prehistory and Archeology with a primary interest in northwestern European prehistory. He subsequently worked on archeological digs in Wyoming and New Hampshire assessing the environmental impact of construction projects. He is delighted with his new position in the MCZ Library since he has discovered that he prefers an academic environment and his interests have shifted to biology.



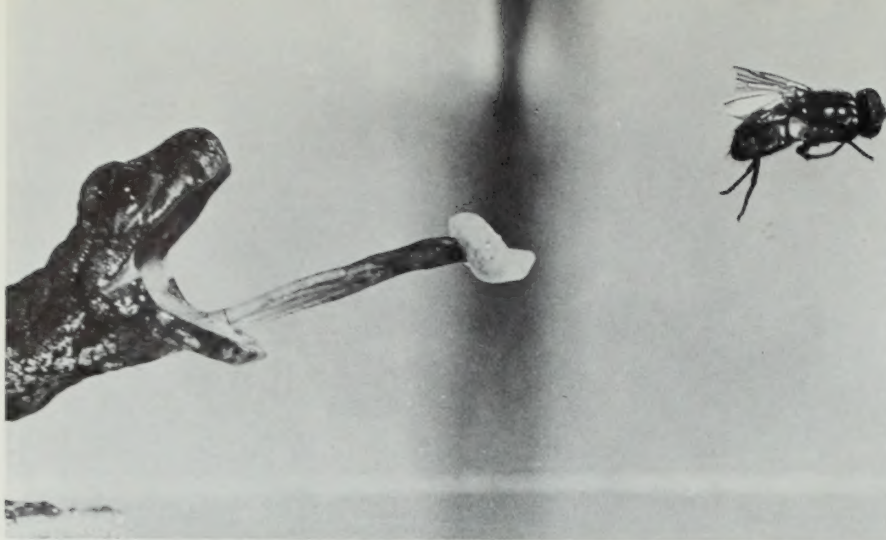


Photo by Dr. Gerhard Roth, University of Bremen

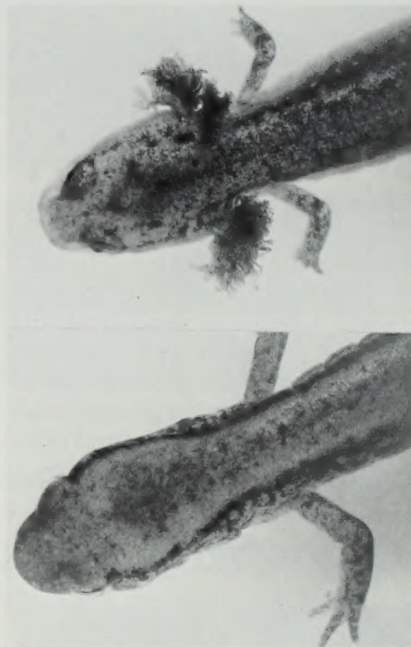
*An adult salamander from a related species demonstrating the use of the hyobranchial skeleton in the projectile tongue.*

## Pere Alberch Awarded Major Grant

Dr. Pere Alberch, Assistant Professor of Zoology and Assistant Curator of Herpetology, has been awarded a three-year grant from the national Science Foundation Developmental Biology Program to study cartilage remodeling during amphibian metamorphosis.

This project is part of Alberch's general inquiry into the relationship between development and evolution. In order to understand this relationship, it is necessary to have a sound understanding of the general properties of embryonic systems.

Development in vertebrates can be characterized as a process of progressive cellular specialization. Embryonic cells are identical as they begin life. They then undergo an irreversible process of differentiation, specializing into adult tissue types (e.g., muscles cells, bone cells, etc.). In vertebrates there are three exceptions to this general rule: 1) in cancer, which causes the cells to dedifferentiate and return to an unspecialized state; 2) in amphibian limb regeneration, a process in which the cells in the limb breakage area dedifferentiate, becoming embryonic in appearance, and then respecialize; and 3) in amphibian metamorphosis, where the tissues and organs of the aquatic larva undergo a dramatic structural change at metamorphosis and become specialized for a terrestrial adulthood. It is this



*The aquatic larval and adult terrestrial stages of the two-lined salamander. Note the feathery external gills in the larval stage.*

third area with which Alberch's study is concerned; he uses the hyobranchial apparatus as a model system. The hyobranchial apparatus is a group of bones which support the gill arches in the larval stage in salamanders.

Using a common inhabitant of New England streams, the two-lined salamander (*Eurycea bislineata*), Alberch is investigating the process by which the bones forming the floor of the mouth and the external gill bones, which move

for respiration and suction feeding, are reabsorbed during metamorphosis, when the animal becomes terrestrial and evolves a projectile tongue used in feeding. The whole process, which is completed in less than two weeks, is accompanied by a major remodeling of the hyobranchial apparatus; certain bones completely degenerate while new ones form and others become reshaped to be able to work in their new function. Alberch, with the assistance of technician **Emily Gale**, plans a three-pronged approach in the quest to understand how this complex process is controlled.

1) By measuring the levels during metamorphosis of thyroid hormones which may be involved in controlling skeletal modifications. This work, which is technically challenging since these salamanders have miniscule amounts of blood, is being carried out at the thyroid unit at Brigham and Women's Hospital with the assistance of Dr. **Reed Larsen**, a world authority on the development of radioimmunoassays for thyroid hormones in humans.

2) By experimental manipulation which will involve transplanting exclusively adult bones to salamanders in the larval stage and vice-versa to study the development of these bones in the "wrong" embryonic context.

3) By tissue culture experiments which involve immersing the bones in different hormone concentrations to measure differential hormone sensitivity of the various elements.



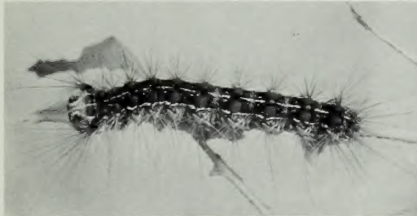
*A salamander is the center of attention; technician Emily Gale, visiting German assistant Wolfgang Grunwald, and Pere Alberch in the lab.*



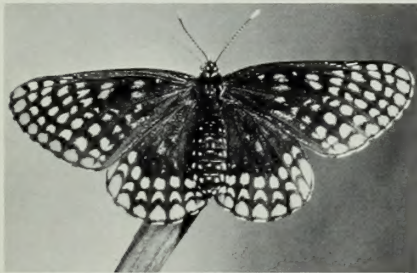
It is essential to understand the mechanisms controlling morphogenesis to get a clear picture of how an organism develops. It is in this area that the usually unrelated fields of embryology and evolution can interact fruitfully.

## Deane Bowers' Insect/Plant Study Funded

Plants and insects are engaged in a constant struggle: how plants protect themselves from insects and the strategies the latter devise to overcome these defenses is the focus of Assistant Professor Deane Bowers' two-year project, funded by a grant from the National Science Foundation's Division of Ecology.



Two insects which are playing a leading role in Bowers' research: the gypsy moth, a far-ranging generalist . . .



and the Baltimore checkerspot, a narrow specialist.

Plants contain a variety of chemicals that give them their characteristic tastes and smells and include such compounds as alkaloids, tannins, terpenes, and many others which are presumed to defend plants from herbivores. Bowers is interested in a particular group of these compounds and how they affect two groups of insects: generalists, such as the Gypsy Moth and the Southern Army worm (both economically important pests), which eat a variety of plant species and so must confront a wide variety of plant chemical

defenses; and specialists, such as the Baltimore checkerspot butterfly and the Buckeye butterfly, which eat one or a few plant species and so may be physiologically specialized to deal with a narrow range of plant defenses.

Using the four species of Lepidoptera, she will study how these compounds function to protect plants containing them from being eaten, and how they affect the insects. One of the major questions is whether there are differences between generalists and specialists in how they respond to these chemicals. Bowers' field studies are conducted at Rock Meadow in Belmont and in the Amherst area in western Massachusetts.

### Sebens' Ecology Award

*Continued from page 1*

determined and the role of the environment is less critical. The questions raised are: how do indeterminate growers know when to stop growing? What are the environmental control factors? Any animal must stop growing in time to still be able to reproduce maximally; there is an optimum size for such animals in each habitat type based on food intake and metabolic cost. Sebens constructed a model to predict such growth patterns and found that the sea anemones fit the model. In a poor habitat they stop growing at a smaller size but can still devote a proportionate amount of the body volume to gonad production.

Sebens and his research group are extending their study to other invertebrates such as starfish, sea urchins, and solitary corals and are finding that the same results hold true. Another factor that can affect organism size is competition. In the case of *Alcyonium siderium*, a local octocoral, size is a crucial survival factor. Until they have attained about two years' growth, they are powerless against their competitors (mostly tunicates) but once they attain the size threshold, they are safe from competition. These animals have evolved a survival strategy that puts a premium on early growth and delays reproduction for two years until the "safe" size is reached. Other

closely related organisms reproduce during the first year.

Another one of Sebens' current projects is a study of competition and predation for a whole community on rock surfaces in 30 to 60 feet of water. The group has taken photographs of marked areas for the past six years and are assembling detailed life histories of both individual species and the entire community. They are also using a time-lapse movie camera for three days out of each month to record which predators are visiting the targeted rock areas. This is the first comprehensive study of New England subtidal marine invertebrates, perhaps because the temperatures are not as amenable as those in the waters of the Caribbean, Southern California, or Hawaii where much work has been done. The brand new information is demonstrating that the faunal provinces above and below Cape Cod are dramatically different with as little as 50 percent similarity in benthic species.

There is much still to be learned; for example, no one knows which predators are having the greatest effect. In order to find out, Sebens' group erected subtidal enclosure cages which protect the study animals from their predators; the effects on growth rates and competition were then measured. They also set up controlled predator-prey experiments in labs of the Marine Sciences and Maritime Study Center of Northeastern University at Nahant. Collecting fish and analyzing their gut contents provides further information on which prey are contributing to the bulk of the predators' diet. Preliminary results point to sea urchins as the most important local predator, followed by crabs and fish.

The result of all this activity will lead to a complete profile of the subtidal community, including such organisms as sponges, octocorals, bryozoans, tunicates, and crustose algae, of the northern Massachusetts coast. This research has been supported by two grants from the National Science Foundation (1978-82) and a recently-awarded renewal for 1983-85.

Photos by Deane Bowers





Juan Merkt donned his Peruvian hat to feed the two llamas currently at the Concord Field Station as part of a broad interdisciplinary study.

## CFS Becomes Center for High-Altitude Adaptation Studies

The altitude in Bedford, where the MCZ's Concord Field Station is located, is close to sea level, but this fall's specially assembled group of researchers are conducting experiments there to prepare for higher locales. CFS Director C. Richard Taylor has mobilized a diverse team of scientists to study the effects of high-altitude living on the respiratory, locomotory, and circulatory systems of llamas, vicunas, and taruca, the highest living deer.

Taylor's emphasis is on the animals' physiology. He points out that: "Llamas have adapted to high altitudes in a different way from humans. Humans have a short-term response—they hyperventilate—while llamas have evolved a long-term modification of the oxygen-carrying capacity of the blood and the structures of their lungs, muscles, and cardiovascular system. I want to test the rational design of animals and the problem of cardiovascular oxygen delivery."

Professor Ewald Weibel from University of Bern and his research assistants, are running llamas on the treadmill and analyzing their morphological adaptations. John West and Peter Wagner from the University of California, San Diego who have monitored human response to high altitude during the American expedition to Mount

Everest, are also involved. Professor Peter Hochachka of the University of British Columbia, is contributing physiological and biochemical data to the project and Visiting Scholar Warren Walker from Oberlin is providing mathematical and anatomical support.

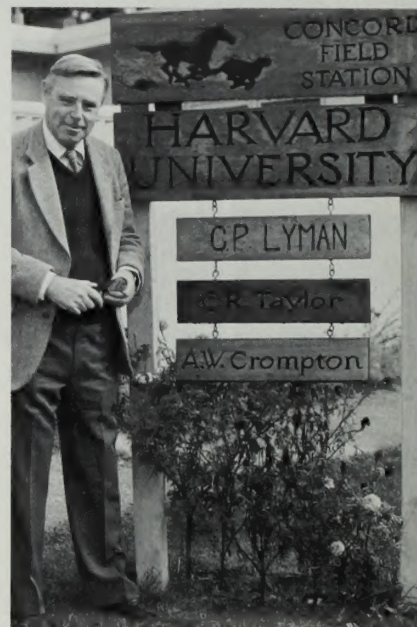
Juan Merkt, who is a native of Lima, Peru and has studied the ecology and behavior of mountain deer in the high Andes for his Master's research with Hochachka has joined the CFS staff for two years to work on the project. Once the data at sea level have been assembled, and with the experience of the CFS studies to prepare them, several members of the group will travel to Peru to continue their studies in situ.

## IMS Grant Funded

The funding of the MCZ's first grant from the Institute of Museum Services is providing funds to support a concentrated effort to increase the museum's visibility in the community, to enlarge the circle of Friends, and to provide more educational programming to school and community groups. The grant will make it possible to increase staffing in the Public Programs Department, to mount a traveling exhibition program, and to keep the museum open one eve-

ning a week. Plans are underway to present special programs for the public on that open evening.

## Visitor

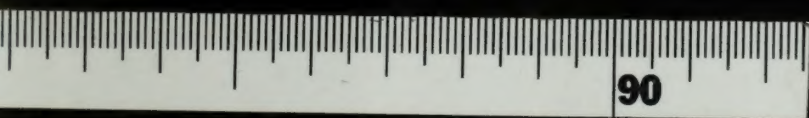
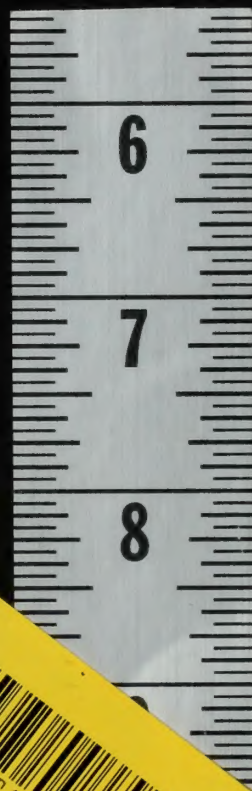
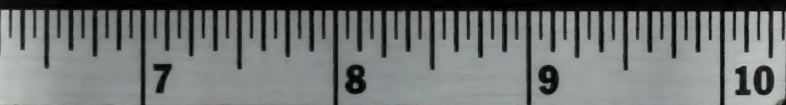


Dr. Warren Walker at the Concord Field Station

Dr. Warren Walker, Professor of Biology at Oberlin College, is a Visiting Scholar at the MCZ and Concord Field Station this fall. The author of the widely-used lab manual *Vertebrate Dissection*, Walker is dividing his time here between revising the manual and another work, *General Zoology*, co-authored with Claude A. Villee of Harvard Medical School and Robert D. Boreas of Gettysburg, and participating in the multi-disciplinary studies being conducted at the Field Station.

An expert in anatomy, Walker is interested in the functional aspects of locomotion and in the relationship of an animal's shape to its size. He is participating in a pilot study of design in animals based on considerations of geometrical and elastic similarities as well as the angles of fibres and length of muscles. His participation in the research projects being conducted at the Field Station is mutually beneficial: he is contributing his knowledge of anatomy to the experimental data while he is learning more about energetics, an area of current interest.





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